0.a. Goal

Goal 6: Ensure availability and sustainable management of water and sanitation for all

0.b. Target

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

0.c. Indicator

Indicator 6.5.2: Proportion of transboundary basin area with an operational arrangement for water cooperation

0.d. Series

The metadata applies to all series under indicator 6.5.2.

0.e. Metadata update

2021-12-06

0.f. Related indicators

SDG indicator 6.5.2 provides a complement to SDG indicator 6.5.1 which measures the advancement of integrated water resources management (IWRM) at all levels.

In addition, as the only indicator in the 2030 Agenda for Sustainable Development explicitly referring to transboundary cooperation, indicator 6.5.2 can play a catalytic role across multiple SDGs and targets including:

SDG 1 – No Poverty

- Indicator 1.1.1 Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural)

- Indicator 1.4.1 Proportion of population living in households with access to basic services

SDG 2 – Zero Hunger

- Indicator 2.4.1 Proportion of agricultural area under productive and sustainable agriculture

SDG 3 – Good Health and Well-being

- Indicator 3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WASH) services)

SDG 4 – Quality Education

- Indicator 4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment

SDG 5 – Gender Equality

- Indicator 5.5.2 Proportion of women in managerial positions

SDG 7 – Affordable and Clean Energy

- Indicator 7.1.2 Proportion of population with primary reliance on clean fuels and technology

- Indicator 7.2.1 Renewable energy share in the total final energy consumption

SDG 11 – Sustainable Cities and Communities

- Indicator 11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damange to critical infrastructure and disruption of basic services

SDG 13 – Climate Action

- Indicator 13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions

SDG 14 – Life below Water

- Indicator 14.1.1 Index of coastal eutrophication and floating plastic debris density

- Indicator 14.2.1 Proportion of national exclusive zones managed using ecosystem-based approaches

SDG 15 – Life on Land

- Indicator 15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type

- Indicator 15.2.1 Progress towards sustainable forest management

SDG 16 – Peace, Justice and Strong Institutions

- Indicator 16.1.2 Conflict-related deaths per 100,000 population, by sex, age and cause

- Indicator 16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group

SDG 17 – Partnerships for the Goals

- Indicator 17.9.1 Dollar value of financial and technical assistance (including through North-South, South-South and triangular cooperation) committed to developing countries

- Indicator 17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development

0.g. International organisations(s) responsible for global monitoring

Intergovernmental Hydrological Programme of United Nations Educational, Scientific and Cultural Organization (UNESCO-IHP)

United Nations Economic Commission for Europe (UNECE)

1.a. Organisation

Intergovernmental Hydrological Programme of United Nations Educational, Scientific and Cultural Organization (UNESCO-IHP)

United Nations Economic Commission for Europe (UNECE)

2.a. Definition and concepts

Definition:

The indicator monitors the “transboundary basin” area within a country covered by an “operational” “arrangement for water cooperation”.

A “transboundary basin” refers to a river or lake basin, or an aquifer system that marks, crosses or is located on boundaries between two or more states. A basin comprises the entire catchment area of a surface water body (river or lake), or for groundwater, the area of the aquifer, i.e. the entire permeable water-bearing geological formation. For the purpose of calculating the value of SDG indicator 6.5.2 the transboundary basin area is the extent of the catchment area (river or lake basin); or the extent of the aquifer.

“Arrangement for water cooperation” refers to a bilateral or multilateral treaty, convention, agreement or other formal arrangement, such as memorandum of understanding between countries sharing transboundary basins that provides a framework for cooperation on transboundary water management. Agreements or other kinds of formal arrangements may be interstate, intergovernmental, interministerial, interagency or between regional authorities.

“Operational” means that an agreement for cooperation between the countries sharing transboundary basins meets all the following criteria:

- There is a joint body or mechanism (e.g. a river basin organization) for transboundary cooperation;

- There are regular, i.e., at least annual, formal communications between riparian countries in form of meetings (either at the political and/or technical level);

- There is a joint or coordinated water management plan(s), or joint objectives have been set;

- There is a regular, i.e., at least annual, exchange of data and information.

Concepts:

The monitoring has as its basis the spatial coverage of transboundary basins shared by each country, and focuses on monitoring whether these are covered by cooperation arrangements that are “operational”. The criteria to be met for the cooperation on a specific basin to be considered “operational”, seek to capture whether the arrangement(s) provide the basic elements needed to allow that arrangment to implement cooperation in water management.

2.b. Unit of measure

Basin area, in km^2, covered by operational arrangements.

3.a. Data sources

At the country level, ministries and agencies responsible for surface water and groundwater resources (depends on the country but commonly the ministry of the environment, water, natural resources, energy or agriculture; institutes of water resources, hydrology or geology, or geological surveys) typically have the spatial information about the location and extent of the surface water basin boundaries and aquifer delineations (as Geographical Information Systems shapefiles). Information on existing arrangements and their operationality is also commonly available from the same institutions.

Some countries already report to regional organizations on the advancement of transboundary water cooperation, and similar arrangements could be strengthened and facilitated.

In the absence of available information at the national level, global datasets on transboundary basins as well as databases of agreements and organizations for transboundary cooperation are available, which could be used in the absence of more detailed information, in the short term in particular.

-Delineations of transboundary basins

In global databases, the most up-to-date delineations are available through the Transboundary Waters Assessment Programme (TWAP). TWAP covered 286 main transboundary rivers, 206 transboundary lakes and reservoirs and 199 transboundary aquifers. Relevant information has also been compiled for 592 transboundary aquifers and groundwater bodies by the UNESCO Internationally Shared Aquifers Resources Management Programme (ISARM - http://www.isarm.org/) and also through the TWAP groundwater component (see https://ggis.un-igrac.org/).

-Cooperation arrangements

Existing agreements or other arrangements for transboundary water cooperation are available from the International Freshwater Treaties Database, maintained by Oregon State University (OSU). This was updated to include all arrangements up to 2008, and a subsequent update will be available in 2021. The treaty database includes in total 686 international freshwater treaties.

-Organizations for transboundary water cooperation

OSU’s International River Basin Organization (RBO) Database provides detailed information about over 120 international river basin organizations, including bilateral commissions, around the world.

Regional assessments describing and inventorying agreements have been undertaken, contributing to the baseline globally, for example, regional inventories of transboundary aquifers under the UNESCO-IHP

ISARM.

3.b. Data collection method

Data on transboundary basins and their operational arrangements has not been traditionally included within the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries.

Spatial information (“transboundary basin area”) is normally available in ministries in charge of water resources. Regarding the operationality of arrangement, the data needed for calculating the indicator can be directly obtained from information from administrative records (Member States have records of cooperation arrangements).

The limitations in terms of comparability of the results between countries are the same as the ones described in Section 4.b. However, a clear definition and consideration of the criteria as developed in the detailed methodology is available to countries to ensure a common reference for the countries.

Moreover, the elements of the indicator are based on the main principles of customary international water law, which are also contained in the two UN conventions – 1997 Convention on the Law of the Non-navigational Uses of International Watercourses (Watercourses Convention) and the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) – as well as the draft Articles on The Law of Transboundary Aquifers (2008; UN General Assembly resolutions 63/124 and 66/104).

The mechanism of reporting under the Water Convention also allows for sub-components of the indicator to be reported by countries, which will ensure both more confidence on the final indicator value (validation) and increased comparability.

3.c. Data collection calendar

First reporting exercise, in 2017; and then at three yearly intervals.

3.d. Data release calendar

Early 2018; and then at three yearly intervals

3.e. Data providers

Data are not so far included in the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries at the ministries or agencies responsible for water resources. Spatial information (“transboundary basin area”) is normally available in ministries in charge of water resources. The value of this component is relatively fixed although the precision may vary (especially on aquifers), and may require only limited update on the basis of improved knowledge. Regarding operationality of arrangement the data needed for calculating the indicator can be directly obtained from information from administrative records (Member States have records of cooperation arrangements).

3.f. Data compilers

UNECE and UNESCO-IHP gather the information needed from the 153 countries sharing transboundary basins for the calculation of the indicator, especially on the transboundary basins (rivers, lakes and aquifers) shared by countries, the applicable cooperative arrangements, and their operationality.

Since 2017, the Water Convention’s regular reporting on transboundary water cooperation, commits its Parties to collect information relavant to SDG indicator 6.5.2, as part of an established mandatory mechanism for Parties every 3 years. The reporting covers transboundary rivers, lakes and

groundwaters. More than 130 countries participate in the Water Convention’s activities, as non Parties are also invited. UNECE acts as Secretariat for the Water Convention.

Some countries also report to regional organizations (e.g. the European Union or the Southern African Development Community) on the advancement of transboundary water cooperation, and similar arrangements could be strengthened and facilitated.

4.a. Rationale

The majority of the world’s water resources are shared: 592 transboundary aquifers have been identified and 287 transboundary lake and river basins cover nearly one half of the Earth’s land surface and account for an estimated 60% of global freshwater. Approximately 40% of the world’s population lives in river and lake basins shared by two or more countries and over 90% lives in countries that share basins. Development of water resources has impacts across transboundary basins, potentially on countries sharing transboundary basins, and use of surface water or groundwater may affect the other resource, which are often interlinked. Intensive water use, flow regulation or pollution risks going as far as compromising the development aspirations of countries sharing transboundary basins and therefore transboundary cooperation is required. However, cooperation is in many cases not advanced.

Specific agreements or other arrangements concluded between countries sharing transboundary basins are a key precondition to ensure long-term, sustainable cooperation. International customary water law (as reflected in the 1997 Watercourses Convention, the 1992 Water Convention, and the draft Articles on the Law of Transboundary Aquifers, as well as existing experience and good practices, all point to minimum requirements for operational cooperation. These minimum requirements are captured by the four criteria for operationality.

This is the basis for the explicit call for transboundary water cooperation in the wording of target 6.5 and the importance of monitoring this indicator to complement indicator 6.5.1 which measures the advancement of Integrated Water Resources Management (IWRM).

Progress by a particular country towards the cooperation aspect of target 6.5, reflected by the value of indicator 6.5.2, can be achieved either by establishing new operational cooperation arrangements, or making existing arrangements operational by developing and regularizing activities, or expanding the coverage of cooperation arrangements with the ultimate objective to cover all surface waters and groundwaters.

4.b. Comment and limitations

The spatial information on transboundary surface water basins’ boundaries and the extent of the catchment areas are commonly available and essentially static; consequently, once determined, no updating need is expected.

The information on the areal extent of transboundary aquifers may evolve over time as such information is generally more coarse but likely to improve because of the evolving knowledge on aquifers. Technical studies and exchange of information will improve the delineation and might also lead to the identification of additional transboundary aquifers.

In situations where more than two riparian countries share a basin, but only some of them have operational cooperation arrangements, the indicator value may mask the gap that a riparian country does not have cooperation arrangements with all its upstream and downstream neighbours. Such complementary information can be obtained by aggregating data at the level of the basins but not from the reporting at the national level.

The legal basis for cooperation develops slowly: conclusion of new agreements on transboundary waters is commonly a long process that takes many years.

The operationality of cooperation is more dynamic as it evolves with the expansion of cooperation. The operationality can be expected to evolve over shorter time frames, and in a year or two, progress could potentially be observed.

4.c. Method of computation

Step 1 Identify the transboundary surface waters and aquifers in the territory of the country

While the identification of transboundary surface water is relatively straightforward, the identification of transboundary aquifers often requires more considered investigations.

If there are no transboundary surface waters or groundwaters, reporting is not applicable.

Step 2 Calculate the surface area of each transboundary basin and the total sum

Commonly at least the basins of the rivers and lakes have been delineated through topographic maps and the basin area is known or easily measurable.

The total transboundary surface area in the country is the sum of the surface areas in the country of each of the transboundary basins and aquifers (expressed in km2). Transboundary areas for different types of systems (e.g. river and lakes basin and aquifers) or multiple aquifers may overlap. The area of transboundary aquifers, even if located within a transboundary river or lake basin, should be added to be able to track progress of cooperation on transboundary aquifers.

The calculations can most easily be carried with Geographical Information Systems (GIS). Once generated, with appropriate tools for spatial analysis, the shapes of the surface river and lake basins and the aquifers can be used to report both disaggregated (for the surface water basin or aquifer) and aggregated (agreement exists on either one).

Step 3 Review existing arrangements for transboundary water cooperation and verify which transboundary waters are covered

Some operational arrangements for transboundary water cooperation in place cover both surface waters and groundwaters (and their associated river and lakes basins and aquifers). In such cases, it should be clear that the geographical extent of both is used to calculate the indicator value. In other cases, the area of application may be limited to a border section of the river basin or sub-basin and in such cases only the corresponding area should be considered as potentially having an operational arrangement for calculating the indicator value. At the end of this step, it should be known which transboundary basins are covered by arrangements for transboundary water cooperation (and their respective areas).

Step 4 Check which of the existing arrangements for transboundary water cooperation are operational

The following check-list allows countries to determinine whether the cooperation arrangement on a particular basin or in relation to a particular country is operational:

- does a joint body or mechanism for transboundary water cooperation exist?

- are there at least annual (on average) formal communication in form of meetings, either at the political and/or technical level?

- has a joint or coordinated water management plan(s), or of joint objectives been adopted?

- is there at least annual (on average) exchange of information and data?

If any of the conditions are not met, the arrangement for transboundary water cooperation cannot be considered operational. This information is currently available in countries and can also be withdrawn from global, regional or basin databases.

Step 5 Calculate the indicator value

Calculate the indicator value, by adding up the total surface area in the country of the transboundary surface waters or aquifers that are covered by an operational cooperation arrangement and dividing it by the total summed up area in the country of all transboundary basins (including aquifers). The sum should then be multiplied by 100 to obtain a percentage.

4.d. Validation

Countries are requested to submit data on their transboundary basins covered by operational arrangements through the uses of a reporting template or questionnaire. The templates are submitted to the co-custodian agencies, UNECE and UNESCO for review. Countries are encouraged to submit drafts of their templates to the custodian agencies for feedback prior to the final submission. Once submitted, the custodian agencies review the national templates to assess firstly, whether sufficient and accurate information is provided in order to calculate the national SDG indicator value, and secondly, whether an official endorsement of the template is provided (in the form of a signature).

4.f. Treatment of missing values (i) at country level and (ii) at regional level

• At country level

In the case of spatial data: For the basin delineations, Digital Elevation Model information can be used to delineate surface water basin boundaries. For aquifers, geological maps can provide a basis for approximating aquifer extent. In the case of groundwater, uncertainty about transboundary nature remains unless investigations of hydraulic properties have been made. In the absence of administrative records, gaps about the cooperation arrangements are difficult to fill, although such arrangements tend to be widely available.

• At regional and global levels

The indicator does not apply to countries without a terrestrial border, so notably island states will not report a value on this indicator.

International databases and inventories (as described in section 3.a) are available for reference in the absence of information reported by countries. Missing surface water basin extent can be extracted from Digital Elevation Models available globally. Global geological maps and maps of hydrogeology/groundwater potential also exist which could be used to approximate aquifer extent (surface area).

Concerning arrangements, consistency of information reported by countries sharing the same transboundary basins can be used to fill gaps in information about arrangements and their operationality.

4.g. Regional aggregations

Regional and global estimates are obtained by undertaking the average of individual country values at regional and global level.

However, baseline assessment from global databases can be performed at any desired geographical scale: sub-national, national, regional, basin scale, global, etc. However, data gaps can limit this possibility starting from regional level.

4.k. Quality assessment

Through UN-Water, UNECE and UNESCO have developd a step-by-step methodology that countries can use to compile data at the national level on SDG indicator 6.5.2. The methodology, which was revised in January 2020 prior to the second reporting exercise, is available in English, French, Russian and Spanish through the UN-Water website - https://www.unwater.org/publications/step-step-methodology-monitoring-transboundary-cooperation-6-5-2/.

In addition, UNECE, through an expert group made up of both parties and non-parties to the Water Convention, developed a *Guide to reporting under the Water Convention and as a contribution to SDG indicator 6.5.2 (*see https://unece.org/environment-policy/publications/guide-reporting-under-water-convention-and-contribution-sdg) in January 2020. The guide, which is available in Arabic, English, Frensh, Russian and Spanish, supports countries in the completion of the reporting template by explaining key terminology and providing examples of how particular questions might be addressed.

5. Data availability and disaggregation

Data availability:

Before starting the SDG reporting process, data were not included in the National Statistical Systems but the information needed to calculate the indicator is simple, does not require advanced monitoring capacities and is normally available to all countries at the ministries or agencies responsible for water resources.

Data is available for the 153 countries having territorial borders in a number of existing databases.

Disaggregation:

Data would be most reliably collected at the national level. Basin level data can also be disaggregated to country level (for national reporting) and aggregated to regional and global level.

6. Comparability/deviation from international standards

Sources of discrepancies:

As the computation of the indicator is based on the spatial information (“transboundary basin area”) and operationality of arrangements as the two basic components, differences can arise in the computation of each of these components individually.

Regarding both components, countries have the most up-to-date information, which can be supplemented by the data from various international projects and inventories, which contribute also to establishing a baseline globally.

The difference on the value of transboundary basin area can arise from a different delineation of the transboundary water bodies, especially aquifers, or even the consideration of their transboundary nature as their identification and delineation can be based on different hydrogeological studies and can be updated, which is not necessarily reflected in international databases.

The difference in the consideration of the operationality of the arrangements may arise from not identifying the same arrangements or considering differently the four criteria that serve as the basis for the operationality classification:

- existence of a joint body or mechanism for transboundary cooperation

- regularity of formal communication in form of meetings

- existence of joint or coordinated water management plan(s), or of joint objectives

- regularity of the exchange of information and data

A different interpretation in the object of application (only surface water or both surface water and groundwater) may constitute another reason.

Collection of country input through validation mechanisms, has improved and will continue to improve, the consistency and accuracy of the information across the countries as the monitoring progresses.

7. References and Documentation

UNECE: https://unece.org/environmental-policy/water/transboundary_water_cooperation_reporting

UNESCO: http://www.unesco.org/new/en/ihp;

UN-WATER SDG6 monitoring: www.sdg6monitoring.org/indicator-652

UN-WATER SDG6 data portal: www.sdg6data.org/indicator/6.5.2

Decision VII/2 establishing the reporting mechanism under the Water Convention: https://unece.org/DAM/env/documents/2015/WAT/11Nov_17-19_MOP7_Budapest/ece.mp.wat.49.add.2.eng.pdf

Additional documentation:

Global Environment Facility's Transboundary Waters Assessment Project: http://www.geftwap.org/

Internationally Shared Aquifer Resources Management (UNESCO's International Hydrological Programme): http://www.isarm.org/

Treaties on transboundary waters, Oregon State University: https://transboundarywaters.science.oregonstate.edu/content/international-freshwater-treaties-database

International River Basin Organisations database, Oregon State University: https://transboundarywaters.science.oregonstate.edu/content/international-river-basin-organization-rbo-database

Regional examples:

Assessment of transboundary water cooperation in the pan-European region: https://unece.org/environment-policy/publications/second-assessment-transboundary-rivers-lakes-and-

groundwaters

Inventory of Shared Water Resources in Western Asia:
https://www.unescwa.org/publications/inventory-shared-water-resources-western-asia